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Vol. XII, No. 13

Monday, January 27, 1919

WHOLE No. 327

A Partial List of the 510 Schools That Use Graphic Latin

HIGH SCHOOLS

PRIVATE SCHOOLS

Akron, Ind. Albion, Mich. Anthon, Iowa Ariel, Pa. Arlington, Ind. Arlington, Mass.

Academy of Notre Dame, Roxbury, Mass. " the Sacred Heart, Boston. St. Louis. " " Visitation, Dubuque, Iowa. All Saints School, Sioux City, So. Dak. Miss Barstow's School, Kansas City, Mo. Belmont Abbey College, Belmont, N. C.

Ashland, Nebr. Atlanta, Ind. Bainbridge, Pa. Baltimore, Md. Bancroft, Iowa Beacon, N. Y.

Blackstone College, Blackstone, Va. Brimmer School, The, Boston. Brunswick School, Greenwich, Conn. Buies Creek Academy, Buies Creek, N. C. Cascadilla School, Ithaca, N. Y.

Belleville, N. J. Belmond, Iowa Benton Harbor, Mich.

Ceaderville College, Ceaderville, O. Centenary College, Shreveport, La. Colgate University, Hamilton, N. Y.

Berrien Springs, Mich. Biddeford, Me.

College of the Incarnate Word, San Antonio, Texas College of St. Elizabeth, Convent, N. J.

Black River Falls, Wis. Bloomfield, Nebr. Bonesteel, So. Dak. Brattelboro, Vt.

Columbian College, Westminster, B. C., Can. Connecticut College, New London, Conn. Country Day School, Newton, Mass. Country Day School, Kansas City, Mo. Miss Craven's School, Newark, N. J.

Bristol, Pa. Brookfield, Mo. Butler, N. J. Butte, Nebr.

Culver Military Academy, Culver, Ind. Dartmouth College, Hanover, N. H. Dean Academy, Franklin, Mass.

Canton, O. Caledonia, O.

DeVeaux School, Niagara Falls, N. Y. East Carolina Teachers' Training School, Greeneville, N. C. Franklin School, Cincinnati, O.

Cambridge, Mass. Carey, O.

Ga. Normal and Industrial College, Milledgeville, Ga. Georgetown Visitation Convent, Washington, D. C.

Catasauqua, Pa. Central City, Ky.

Girls' Collegiate School, Los Angeles, Calif. Groton School, Groton, Mass.

Chelsea, Mass. Chicopee, Mass. Cincinnati, O.

Gunston Hall, Washington, D. C. Hawken School, Cleveland, Ohio.

Clarksburg, W. Va. Henderson-Brown College, Arkadelphia, Ark. Clark's Summit, Pa. Holderness School, Plymouth, N. H.

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JOHN C. GREEN. Jr.

Latin Instuctor, BLAIR ACADEMY

BLAIRSTOWN, N. J.

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CAESAR IN GAUL

This book simplifies greatly the change from first-year work to second-year work. The life of Caesar in easy Latin at the beginning of the book admirably reviews the forms and the syntax of the first year, and serves to introduce the Gallic War. In the first two books the use of direct in place of indirect discourse removes a genuine hindrance to progress. In one volume are included text, grammar, proseeverything necessary to the work of the second year. Both maps and illustrations are exceptional.

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PROFESSOR W. W. HYDE ON THE MOUNTAINS OF GREECE

The student of the Classics is constantly learning that matter of great importance to him in his studies has been published in journals which he rarely, if ever, sees. One such paper, entitled The Mountains of Greece, by Professor Walter Woodburn Hyde, of the University of Pennsylvania, was published in 1915, in The Bulletin of the Geographical Society of Philadelphia, 13.1–16, 47–64, 110–126. The contents of the paper are as follows:

Introduction (1-2); Influence of the Mountains on Greek Character and History (2-3); The Contour of the Balkan Peninsula (3-4); Distribution of Greek Mountain Chains (4-9. The subdivisions here are: North Greece, 4-5: Central Greece, 5-6: The Peloponnesus, 6: The Mountainous Character of Arcadia, 6-8: System and Confusion, 8-9); "The Lively Grecian in a Land of Hills" (9); Prevalence of the Horizontal Line in the Greek Mountains (10); Geologic History Reflected in Greek Myths (10-13); Geologic Changes During Historic Times (13-16, 47-50. Subdivisions here are <Upheavals>, 13: Vulcanism, 14-16: Subterranean Streams, 47-49: Earthquakes in Modern Greece, 49-50); The Contours of Greek Mountains Reflected in Their Names (50-51); Deforestation of Greek Mountains (51-53); The Artistic Grouping of Greek Mountains (53-55); Individuality of their Coloring (55-56); The Luminous Atmosphere of Athens (56-57); Poetic Legends About the Mountains (57); The Uses to Which the Greeks Put Their Mountains (58-64, 110-116. Subdivisions here are Sanctuaries, 58-59; Watch-Towers, 59-60: Telegraph Stations, 60-64, 110-111: Used as Marble Quarries, 111-114); Scientific Study of Mountains by the Ancient Greeks (114-118. Subdivisions are Scientific Calculations of the Heights of Greek Mountains, 114-117: Mountain Ascents for Scientific Purposes, 117-118); Mountain Ascents for Pleasure (118-120); The Greek Romantic Feeling for Mountains (120-121); The Chief Interest of the Greek his Fellowman (121-122); Attracted More by the Quiet Aspects of Nature than by the Wild and Savage (122-123); A Description of a Mountain in Aeschylus (123): Greek Feeling of Sympathy for their Mountains (123-125); Difficulty of Appreciating the Ancient Feeling Now (125-126).

If we turn now to matters of detail, we shall find much that will be not only instructive, but also fascinating. On page 7 Professor Hyde emphasizes the contrast between the real nature of Arcadia as "a network of rugged hills and cliffs strewn about in Tyrolean profusion" and the picture of Arcadia as drawn by the later poets. Arcadia's

frowning ridges and gorges, with torrents dashing headlong for hundreds of feet from overhanging cliffs, suggest anything but the delights of pastoral ease.

In a footnote Professor Hyde suggests that in order to soften the harshness and sternness of the people, caused by the bleakness of their surroundings and climate, musical education seems to have been compulsory in most of the Arcadian towns.

Interesting, too, is the following paragraph from page 10:

Perhaps the most striking feature of these mountains is the "prevalence of the horizontal line"; for there is no peak high enough to dwarf all the others. Myder dyar, "nothing in excess", the guiding principle of their life, the Greeks seemed to have learned from their physical environment. Here one's attention is not riveted on one or even a few summits to the exclusion of the lesser ones. In Switzerland it is always a Mt. Blanc, a Matterhorn, a Jungfrau or an Ortler which claims the traveller's attention. But in Greece the eye rests on a succession of peaks, none of which has a commanding interest. Even Olympus itself, at the extreme northeastern corner of the country, is only 1,500–2,000 feet higher than six other peaks. Though several may be snow-clad for a part of the year, not one reaches the limit of perpetual snow. The nine highest—exclusive of Olympus—only vary a little over a thousand feet in height.

On pages 11-12 Professor Hyde writes:

Few lands have been the scene of more terrible upheavals of nature than Greece. Many echoes of these geologic conflicts are preserved to us in Greek legends, especially in those of Thessaly. Here mighty battles were fought, in which the combatants, like the Lapiths and Centaurs, used trees and rocks for missiles, or, like the Titans and later Giants, hurled rocks and hills at one another and even piled mountain on mountain. . . . As you look out over the mountain-locked plain of Thessaly, you can well understand why geology and legend concur in picturing it as once a great inland sea, until finally its waters broke their way through the cleft of Tempe between the bases of Ossa and her giant neighbor Olympus.

Such myths seem to reflect the final throes of the long epoch when Greece was the theater of that tremendous volcanic action which slowly formed her mountains, plains, and coasts. Such disturbances lasted down into historical times and were continued by earthquakes which even yet are the bane of the country.

In beginning his study (58) of the uses to which the Greeks put their mountains, Professor Hyde writes as follows:

At the outset it may be said that they always felt for them a religious veneration and awe. From the names of some of them we can also see that in very early times they must have viewed them with terror. For if the Greeks more often associated their hills with well known animals and objects, the names of others show that they had a very different feeling toward them. Thus Maenalus means the "wild and tempestuous" mountain; Ceraunia is the "thunder" range; Tymphrestus . . . means a "whirlwind"; Ptoon . . . is the "terrifying" hill, while Phrikion—a hill near Thermopylae . . . would answer to the Swiss "Schreckhorn".

Hence the mountains were early used as places for the erection of altars at which to appease awe-inspiring deities. But very early the Greek mountains began to be used in the history of warfare for much more practical purposes, such as watch-towers and telegraph stations. The early name of Corinth, Ephyre, Professor Hyde derives from epopdw. One of the peaks of Taygetus was called Euoras . . . which, as Professor Hyde notes, could be exactly translated by 'belvedere'. The discussion of the use of mountains as telegraph stations I found particularly interesting, because it reminded me so vividly of my own revered teacher, Professor A. C. Merriam, who wrote on this subject many years ago; on this paper Professor Hyde largely relies. The use of mountains in this way is already mentioned in the Iliad (18.203-214). On pages 61-62 there is a detailed account of the line of beacon fires-a line of stations actually in use in Aeschylus's day-described by Aeschylus in the Agamemnon 281-316. Professor Hyde refers also to signalling by means of shields, signalling by means of torches, and by a more elaborate device described by Aeneas Tacticus (110-111).

Professor Hyde tells us that twenty-five ancient quarries can be counted on Mt. Pentelicus; the highest is near the top of the mountain, about 3,300 feet above the sea. The largest is 1,000 feet lower. The marble of Hymettus did not come into prominence until the third century B.C.; it received its greatest celebrity among the Romans. It was of finer grain even than Pentelicus marble, but was generally streaked with bluish-gray; therefore, it was little used for sculpture, but rather for tombs, inscriptions, and buildings. Athenians still quarry the marble of Hymettus in great amounts. The most famous marble quarries in Greece were, of course, those on the island of Paros.

As the old feeling of fear and religious awe inspired by the mountains wore away, the Greeks began, from the end of the fourth century B.C., to calculate the heights of the mountains and later still to climb mountains for scientific purposes (114–117). As was to be expected, most of the calculations were distinctly inaccurate. The most accurate was made by Strabo. He gives the height of Acro-Corinth as 2,100 feet, which is only 214 feet more than the truth. Strabo, again, mentions an ascent of Aetna, which was made apparently for scientific purposes (117–118).

In later times men began to ascend mountains for pleasure, to obtain a wide panoramic view. Thus,

Strabo states that Mt. Argaeus in Cappadocia was ascended on account of its view, since both the Euxine and the Mediterranean, on opposite sides of Asia Minor, were visible from its top (in this he was mistaken). The same author states that he ascended Acro-Corinth for the view, which he describes. Livy recounts the ascent of the Haemus range in Macedonia made by King Philip V. The greatest mountain-climber of antiquity was the emperor Hadrian. He ascended Aetna and Mt. Casius, near Antioch, in Syria, to view the sunrise. He visited also the hill named by tradition as the place whence the Ten Thousand, after their march through Armenia, first saw the sea.

Turning now to discuss the Greek feeling for scenery, so far as it concerns their mountains, Professor Hyde notes that, ever since the time of Alexander von Humboldt, it has been assumed almost universally that the Greeks never really felt any attraction for their scenery. This belief is founded on the fact that so few notices of scenery are to be found in extant literature. Professor Hyde gives his own view, as follows (121-122):

And that the Greeks did feel an intimate sympathy and love for their varied and natural surroundings is actually shown by the wealth of legend which haunted every part of their land; and the picturesque location of many a temple on sea cliff, mountain side and in romantic woodland makes it impossible not to believe that they were possessed of a developed sense of natural beauty, even if definite proofs of it are lacking in their literature and if the feeling was far more limited than with us. We must agree with Shairp that "there is hardly a tone of sentiment which nature in modern times has evoked, of which some faint prelude at least might not be found among them".

The wild and savage in nature did not arouse the same feelings in the Greeks as it does in us; they were far more attracted to the more kindly delights of rural and sylvan scenes. As Professor Hyde notes, the beautiful description of the Attic hill of Colonus in Sophocles's Oedipus Coloneus is a splendid example of their innate love of the gentler beauties of nature.

On pages 123, 124-125 Professor Hyde writes:

. . . There is really but one great description of mountain scenery in the whole literature and that gives us the early Greek feeling of aversion towards the mountains as barren and repulsive wastes. In the Prometheus, Aeschylus takes us to "earth's limit", to the "sky-piercing rocks" and the "star-neighboring peaks" in the neighborhood of the Caucasus. He depends less for his effect on stage scenery and the "thundermill" than on the terrific force of the language in which he describes the rock world. The final scene closes amid a fearful cataclysm of storm and earthquake, a description almost as vivid as the lightning flashes—one of the grandest passages in the whole range of poetry.

their mountains only with feelings of awe and aversion, as fit places on which to erect altars to appease angry deities. Though the name of many a Greek hill shows that in the earliest times they must have viewed them even with feelings of terror, as places that were barren

 $^{^{1}\}mathrm{Reference}$ may be made here to my remarks in The Classical Weekly 9.137–138.

and repulsive and perhaps haunted by evil spiritsplaces to be crossed only under direst necessity—such feelings did not last. It was the less imaginative and more business-like Romans who never were able to conquer their earlier feelings of aversion towards mountain scenery; poets like Catullus and Vergil, born and reared in sight of the Alps, scarcely mention them. But the Greeks, through long familiarity with their hills, soon lost their dread of them and in slow process of time began to look upon them with the kindlier feelings of sympathy and companionship, even if their poets did not stop to describe them in Wordsworthian detail. The reason for the absence of such descriptions, hinted at by Murray in the passage just quoted, lay deep in the psychology of the race, in the very nature of the Greek. Zimmern has shown that landscape poetry, like landscape painting, can only come into existence when a people is able to see itself objectively in its surroundings and no longer feel itself part and parcel of them. Though they had long speculated upon the inner nature of man, the Greeks, up to the close of the fifth century B. C., if not later, had not fully entered upon the stage of self-consciousness in their attitude toward their natural environment. Hard it is for us moderns, sophistocated by all the centuries that lie between us and the Greeks and forever denied the simplicity and freshness of view of that wonderful race, to understand this. For our view of nature is relatively objective while theirs was subjective. As Zimmern puts it: "Like all simple folk, they take a knowledge of their scenery and surroundings for granted in all who listen to them. The Mediterranean landscape, like the institution of the city-state, forms a permanent background to Greek life and thought. Its influence is omnipresent, but it is seldom expressed"².

Professor Hyde's paper is reinforced by 178 footnotes, giving abundant references to the Greek writers, and to modern works on Greek geography. The paper is also beautifully illustrated with views of Greek mountains. C. K.

SECOND YEAR LATIN AND SOME ASPECTS OF THE WORLD WAR

In these days of war activities, when the history teacher is teaching war and the English teacher is demanding themes on war, the Latin teacher naturally asks, 'What shall I do?' The very name of Caesar suggests war; and at this time, when we think war. hear war, eat war, and know that some of our pupils are already feeling the hardships of it, how can we refrain from the discussions that are naturally precipitated by the text we are reading? I do not expect to offer to teachers new material for the teaching of Caesar and, needless to say, I shall not attempt to give expert military information, but I propose to show how the teacher of Latin can use the present opportunity to make Caesar's campaigns real reports from real battlefields in which pupils are now vitally interested.

²Compare Professor Hyde's paper, The Ancient Appreciation of Mountain Scenery, The Classical Journal 11.70–84. Rindred, too, to the themes discussed in this issue is a very suggestive paper, entitled Fortunatus Et Ille, by Professor Tenney Frank, The Classical Journal 12.482–494, in which the writer discusses the attitude of the Greeks and the Romans toward nature, and seeks to explain the absence from their poetry of descriptions of nature. This paper was read at the Twelfth Annual Meeting of The Classical Association of the Atlantic States, held at the Drexel Institute, Philadelphia, May 4, 1918.

The introductory lesson to the Gallic Wars is usually a geography lesson. To-day, the mere presentation of a map of Gaul to any class of American boys and girls awakens keen interest. At once they try to locate the Western Front. Then they are willing to trace the tres partes of ancient Gaul, and are rather eager to learn something about the people who lived in this country that seems so near to them now. 'Are the French the descendants of the Gauls?', and 'Are they like the Gauls?', are some of the questions put to the teacher. Here is the teacher's opportunity to tell his class that they are to have the privilege of answering these questions as they read Caesar's Gallic Wars.

We shall now, for a few minutes, take the pupil's point of view and try to answer some of his questions. First, we shall study the character of the Gauls and then we shall decide whether we think the French are their descendants.

Perhaps one of the first impressions is that the Gauls were a freedom-loving people. The desire to be free, it may be, enabled Dumnorix to foresee in Caesar a future conqueror and made him develop into the scoundrel that Caesar paints. Pupils readily take Caesar's opinion of this interesting revolutionist, and to many the death scene in which he calls upon his retainers to witness that he is a free man of a free people reveals for the first time the motives underlying his conduct, and makes him appear as one of the pioneers of Gallic independence. The Belgae object to the continued presence of the Germans in Gaul, but they as strongly object to the presence of Caesar's army. They are not arrayed particularly against the Germans, but they are guarding their land against foreign invaders. Again and again, particularly in Book 7, the Gauls urge the preservation of liberty as one of their chief duties, and the struggle for independence culminates in the courageous work of Vercingetorix. It is this same love of freedom, which has seemed to live in the land of France, that has made possible for the French people their great Republic and enables them now to furnish inspiration to us and to other nations in our fight for democracy.

Pupils like to find points of similarity, but they feel as if they have achieved even more by finding points of difference. One of the questions sure to come is this, 'The Gauls were not as brave as the modern French, were they?' This immediately provokes a discussion and illustrations are given of Gallic bravery; for instance, the battle of the Aisne, the resistance of the Nervii, and the conduct of the Piso brothers are cited, and, of course, the seventh book of the Gallic Wars furnishes a strong defense of the bravery of the Gauls. Caesar's victorious march through the territory of the Belgae is compared with the German invasion of Belgium and Northern France, and these are some of the questions that have been discussed: 'Was it worth while for any tribe to hold out against Caesar?'; 'Did the reputation for bravery won by the Nervii compensate for the loss of life?'

The mobilitas of the ancient Gauls is sure to bring comparison, and the fifth chapter of the fourth book causes a good deal of comment. Caesar there makes a serious charge, in that he says the Gauls are not to be trusted. Surely, the French of to-day are trustworthy, but here somebody states that the 'French are civilized and the Gauls were not'. One girl volunteers that 'fickleness is characteristic of a mob, and in a mob civilization is apparently lacking'. Another even thinks far enough to say that 'perhaps the Gallic willingness to change and their interest in strangers helped to bring about the present high state of French civilization'.

Here, again, comes the question as to ancestry: 'Were the Gauls the ancestors of the French?' Of course, the answer is in the affirmative, but the dissimiliarity in character is attributed largely to the Romanization of Gaul. Pupils have also discovered that Caesar himself learned from the Remi that the Belgae were descended from the Germans, and, therefore, they had some German traits of character. Somebody knows that the Norsemen brought a certain stability with them, and so we have our modern French-a people in whom are blended the characteristics of several peoples. Pupils, however, should not be allowed to think that this is a complete discussion of the ancestry of the French; they should be told that they have only made a beginning. In spite of this varied make-up, pupils like to trace the loyalty of the French back to the loyalty of the ancient Gauls to their chiefs, for 'Gallic custom esteemed it shameful for retainers to desert their lords even when all was lost'.

American admiration for the French conduct of the World War makes the Gallic conduct of war an easy topic to discuss. In connection with Caesar's encampment upon the banks of the Aisne, a question from the teacher concerning the recent battle on the same river will lead to a comparison of Caesar's battlefield and our battlefield. 'It is exactly the same country', some one remarks. 'France and Belgium have had a hard time', is another comment. 'Did war at that time bring such devastation to a country as it does to-day?', will bring many answers. Somebody is quick to say, 'No, because they did not have the artillery that we have to-day'. 'What has that to do with the devastation?' comes from a slower, but thoughtful member of the class. The first girl is quick to reply 'that heavy artillery ruins the land', whereupon numbers of pupils name the 'tank' and motor trucks as destructive to land. From a far corner of the room is heard the question, 'Do not trenches break up the land more than anything that the ancient people had?' In spite of the fact that one objector urges that Caesar's trenches around his camp cut up the land and that he pitched camp every time he stopped, the general expression of opinion is that the girl in the corner is right, but that the trench is only one of the many things which necessarily devastate the country in the present war. 'The Germans have done so much harm that was not necessary', interposes one pupil; 'so did Caesar', says somebody else, and thus starts an argument.

That shipbuilding was a problem in the Gallic Wars is interesting, and pupils in their naïve way wonder whether Mr. Schwab and the other men in charge of shipbuilding have been inspired in their plans by the speedy and successful preparations of the Romans to fight the Veneti. Pupils derive much pleasure also from this particular campaign by finding in the French the same adaptability that enabled the Veneti to make ships adapted to the sea in which they were to sail.

That the Gauls were also masters of the food situation is evidenced by frequent references to it. We feel quite as if we were reading a daily paper when we read that Vercingetorix has commandeered all the food and that he has drafted all the men who are of an age to bear arms. The fact that the food administrator has also control of the draft causes much speculation as to whether his duties were as numerous as Mr. Hoover's. Vercingetorix's opinion of the permanency of Caesar's peace may be quoted as our opinion concerning the peace proposed by the Imperial German Government, and, so for many reasons, we feel a certain friendly interest in these Gauls who had so many of the difficulties and some of the traits of our allies, the French.

No less interesting is the comparison of Caesar's Germans with the Germans of to-day. Is William II the first German to demand 'a place in the sun?' Is it a new claim that the Germans do not wage an offensive war? Such questions as these put to a class will stimulate comparison, inspire interest, and develop power that might otherwise lie dormant. A pleasing and also a helpful exercise is to allow the class to substitute the name of William II for that of Ariovistus. Ask them to see whether they are startled by anything that they read and at the same time to decide to what extent the ideas and the principles of the Germans have changed.

After reading the description of the Suevi, the teacher asked her class to look through the account and see whether they considered 'German efficiency' really new. It was soon discovered that the ancient Germans were able to farm and to fight at the same time and that they were able to do both well. The statement was made that 'Caesar himself speaks for the farmers when he says "Reliqui, qui domi manserunt, se atque illos alunt" '. Another pupil quoted the Ubii to prove that the Suevi were successful warriors. 'Why were the Suevi proud that the fields on one side of them were unoccupied for six hundred miles?', was asked by one of the slower pupils. Among the several answers given was one that seems worth quoting: 'The Germans to-day do not want to allow small nations to exist near them'. Another point given to prove the efficiency of the ancient Germans was the fact that they always used their own horses and they trained these animals to be useful, no matter how small and ill-shaped they were. The German thrift was also recognized in the admission of traders to their country, not that they desired anything to be imported, but that they might have buyers. Thus, by definite reference to the text, pupils proved for themselves that the Suevi provided equally for war, agriculture, and trade. 'Does the prestige of the Suevi remind you of the prestige of any particular people in Germany to-day?', brought the prompt reply, 'Of the Prussians'; whereupon one of the class suggested that perhaps the Kaiser thought he had a right to claim divine aid since the Suevi had been described by the Ubii as people to whom not even the immortal gods were equal.

One of the topics which has probably always, even before the war, contributed largely to the interest of pupils in the Gallic Wars is the personality of the man Julius Caesar. Perhaps, the very same incidents are given to show the power of his personality that have always been given, but, in the light of present events, these incidents arouse a keener interest than ever before. Take, for instance, the panic in the Roman army during the campaign with Ariovistus. In present day phraseology, men even applied to Caesar for exemption. 'Could our soldiers in the darkest moments show such desperation as was shown in the Roman army?'; 'Could any general in the light of twentieth century civilization show greater wisdom at such a time than was shown by Caesar?', are questions that will start a discussion.

Pupils like to call Caesar's final message to Ariovistus his ultimatum, and they are pleased to find in Caesar a general who cannot be surpassed by any modern general, either in the treatment of his own soldiers or in his diplomatic dealings with an enemy. They discover for themselves the great generalship of Caesar in the control of his army and in the efficiency of his soldiers in many lines of work. In our discussion of the bridge this year, the question was asked, 'Why did Caesar send such a detailed account of this bridge to Rome?' Various answers were given. One girl said, 'He probably wanted to impress the Senate with some of the difficulties which he met'; another answered, 'He may have wanted to show how well he could do all kinds of things'. Then came the question, 'Did Caesar himself direct the bridge building or were there engineers in charge of it?' The amount of work necessary for its construction and the quickness with which the work was done gave proof of the efficiency of Caesar's army.

A comparison of armies usually brings little surprise, for it is expected that a military nation like the Germans will have points of likeness to the Roman army that a peace-loving nation like the Americans will not have. A question frequently asked is, 'Has the Kaiser read Caesar's account of the Gallic Wars?'

That Gaul suffered not only from the Germans, but also from Caesar, is most apparent to all young people who read the Gallic Wars, and that the Kaiser's treatment of the small nation closely resembles Caesar's treatment of the tribe does not surprise them, since most of them know that the Kaiser has taken Julius Caesar as a model.

The important part played by the cavalry in Caesar's army causes comment and calls attention to its comparative absence from our army. Somebody always volunteers with a good deal of pride that 'Our scouting is done by airplanes instead of by cavalrymen'. Also, the girl interested in the Red Cross is sure to ask, 'Was there no provision for the wounded in Caesar's time?'

The account of the preparations for the battle with the Nervii brings to-day an interesting description of the preparations made by our soldiers for going 'Over the Top'. The gas mask is recognized as a return to defensive armor; but here, again, girls who feel as if they have taken a real part in the preparation of our men, by making front line packets, notice that no provision was made during the Roman preparations for the wounds that were sure to come.

The existence of rudimentary international law causes comment. Pupils are interested to find that there was a respect for boundaries between States, and they see for themselves that the Gauls were right in thinking that the wintering of a foreign army on their soil was sufficient reason for mobilizing. The war with the Veneti, Caesar says, was waged because the sacred rights of the ambassador had been violated. The question is always raised by classes as to whether this was Caesar's real reason; but, whether it was or not, the fact remains that the violation of the right of the ambassador was considered a breach of international law sufficiently great to provoke war.

Obsides will bristle with interest for boys and girls if they know that, both in Belgium and in France, the Germans have constantly taken and used hostages. One member of the class may give a special report from German War Practices, one of the pamphlets issued by the Committee on Public Information. For such an assignment there is plenty of material in this pamphlet, but, for illustration, I offer the following extract from a proclamation to the people of Rheims by the General commanding Rheims, September 12, 1914:

'In order to insure sufficiently the safety of our troops and the tranquility of the population of Rheims, the persons mentioned have been seized as hostages by the Commander of the German Army. These hostages will be shot if there is the least disorder. On the other hand, if the town remains perfectly calm and quiet, these hostages and inhabitants will be placed under the protection of the German Army'.

This is only one of a number of similar quotations found in this particular pamphlet, and its value is recognized by a teacher who has heard the questions following such a report.

Another topic of discussion particularly stimulating to those of us who teach girls is the changed position of woman. The Gallic woman with her streaming locks and outstretched hands, appealing to the sympathy of the Romans, seems very remote in point of view from her modern sister who farms, works in the munition factory, drives a car, and does the man's work in a delightfully independent way. Had the ancient Germans understood the capabilities of their women, it

would not have been necessary for the men to fight one year and stay at home the next.

Because our days are so full of the big things of life, it is imperative that we give to our pupils not only the best that is in the authors they are reading, but the best that can be read into them from the events of the present day.

These suggestions are only some of the numerous helps that are within reach of the teacher of Second Year Latin to-day.

WESTERN HIGH SCHOOL, Baltimore, Md.

MARGARET T. ENGLAR.

THE RÔLE OF THE CONCEPT OF INFINITY IN THE WORK OF LUCRETIUS

No doubt there will one day be written the history of the concept of infinity. If it is to be done by an American scholar, it will probably not be done in the present generation, for the doing of it calls for a kind of composite scholarly preparation—linguistic, historical, philosophical, scientific, and especially mathematical—which our American universities have indeed the machinery but not yet, it seems, the spirit or the purpose or the atmosphere or the temper to provide.

In any adequate historical survey of the rôle of the notion of infinity in our human thinking a consideration of the De Rerum Natura of Lucretius will have to be accorded the position of an important chapter. Most of the many great merits of the work have been long, if not generally nor even widely, recognized. One of its recognized merits is its superb daring and the unsurpassed magnificence of its enterprise; another is its probably unmatched union of literary excellence with scientific spirit and aim; still another, which includes many, being a highly composite merit, is its confident and often acutely argued presentation, sometimes in detail and sometimes in clear and striking outline, of ideas and doctrines that came into their own only in modern science. I refer to such concepts and dogmas as natural law, the atomic constitution of matter, the conservation of mass and of energy, organic evolution, spontaneous or chance variation of life forms, struggle for existence, survival of the fit, and sensation as the ultimate basis of knowledge and the ultimate test of reality, not to mention other equally brilliant anticipations of modern scientific thought.

In attempts to appraise the work of Lucretius his employment of the notion of infinity is commonly indicated, but only more or less incidentally. For example, in Masson's large volume, Lucretius, Epicurean and Poet, the term infinite has only a subordinate place in the index of important terms; in Munro's very extensive Notes the term receives but scant attention; and it receives even less in the Notes

found in Cyril Bailey's recent and deservedly much praised English translation of the poem. What is missed in such appreciations and commentaries and what I wish to signalize here is the fact that the concept of infinity-of infinite multitude and infinite magnitude -is not merely one among the many ideas, but is indeed the dominant idea, in the work of Lucretius. A critical examination of the work cannot fail to discover that in the author's judgment the concept in question was at once the most powerful of his instruments and the one most obviously indispensable to the success of his great undertaking. That undertaking was a pretty large contract, being nothing less than the endeavor to show forth a method by which it would be possible to explain, or to account for, all phenomena (whether mental or not) without having to resort to the hypothesis of divine intervention.

This is not the place to give a detailed account of the Lucretian principles and procedure. For the purpose of this note it is sufficient to point out that among the fundamental propositions there are three major propositions and that these owe their efficacy and their dominance of the entire discourse to the fact of their postulating the existence of infinite multitude and infinite magnitude. These propositions are that the universe of space is a region or room of infinite extent; that time is an infinite duration composed of an infinite past and an infinite future; and that the matter in the universe is composed of an infinite multitude of absolutely solid (non-porous) and non-decomposable atoms or 'seeds of things' always moving hither and thither in an infinite variety of ways and ever so distributed throughout the whole of space that of all spheres none but such as are microscopically minute could at any given instant fail to enclose one or more of the 'seeds'. Without these postulated infinites explanation of the phenomena of the world was, in the belief of Lucretius, impossible; with them, supplemented by certain other postulates, such explanation was possible. Though the mentioned postulates were not in themselves sufficient, they were regarded as conspicuously necessary. In the view of Lucretius cosmic history was an eternal drama enacted by an infinitude of unoriginated and indestructible elements operating upon an infinite stage. The drama was not to be understood except by help of the concept of infinity; and so the De Rerum Natura may be not unjustly said to be a kind of poetic celebration of what the author deemed to be the scientific efficacy of that concept.

What did Lucretius mean by infinity? What did he mean by an infinite multitude and by an infinite magnitude? No formal definition of any of these terms is to be found in his work. But it is perfectly clear that he conceived an infinite multitude of elements to be a multitude which could not be exhausted by removing from it one element at a time but which could be thought of as arranged in an endless succession of elements. In other words, an infinite multitude signified what we now describe as a denumerably

¹This paper was read before the American Mathematical Society, December 27, 1917, and was published in the Bulletin of the American Mathematical Society, in April, 1918 (= 24,321-327). It is reprinted here with the consent of its author, who is Professor of Mathematics in Columbia University, and of the Bulletin of the American Mathematical Society.

C. K.

infinite multitude. There is no hint at any conception of any higher order of infinity.

It is noteworthy that, with the possible exception of time, the fundamental infinites of Lucretius were not mere variables capable of increase beyond any prescribed finite amount; on the contrary, they were, like the infinites of Cantor, constant or static affairs; but, unlike the Cantor infinites, those of Lucretius were composed of actual, or concrete, things and not abstract ones like points, for example, or pure numbers; thus the Lucretian infinitude of atoms were material particles and they all existed at once.

Was Lucretius aware of the fact that an infinite multitude, as conceived by him, contained parts or submultitudes equivalent, as we now say, to the whole? He was not only aware of it but he repeatedly employed this characteristic property of infinity effectively and correctly. This rather astonishing fact is sufficiently interesting to justify citation of one or two of the numerous passages supporting its assertion. If we bear in mind that one of the Lucretian infinites was the succession of time unit (days or generations or other stretches) beginning at any given instant and together composing what is called the future, the following famous passage makes it perfectly clear that, according to its author, the removal of any finite multitude of elements from an infinite multitude of them leaves a remainder, a part, exactly equal or equivalent to the whole:

Nor by prolonging life do we take one tittle from the time past in death nor can we fret anything away, whereby we may haply be a less long time in the condition of the dead. Therefore you may complete as many generations as you please; none the less however will that everlasting death await you; and for no less long a time will he be no more in being, who beginning with today has ended his life, than the man who has died many months and years ago².

Lucretius, as already said, postulated the existence of an infinity of atoms. These were not all of them identical in shape or in size but in these respects presented a finite number of varieties. Each variety, it was further assumed, constituted an infinite multitude³. These infinites were not distinguished as such; in respect of multiplicity, though not in respect of their physical functions, they were equivalent to one another and to the whole multitude constituted by their elements.

It is sufficiently evident that the poet's conception of infinite multitude was identical with that now employed by mathematicians. Careful scrutiny of the poem will discover that the same may be said of the author's conception of infinite magnitude. Formal definition of the notion is not present. We are told, however, that in respect of size, all the atoms are between a finite upper bound and a finite lower bound; we are told that the sum of any finite number of atoms is finite; we are told that the sum of all atoms of a given form is infinite and

that, therefore, the number of them must be infinite. It is thus evident that for Lucretius an infinite magnitude is a magnitude greater than the sum of any finite number of finite quantities none of which surpasses, in respect of parvitude, a finite size.

Formation or possession of ideas is one thing; logically correct handling of them in argumentation is quite another. In his use of the ideas in question Lucretius was sometimes right and sometimes wrong. Of right use some examples have already been given and it would be easy to cite others. As an instance of erroneous use the following passage (as correctly translated by Munro, page 15) may be cited on account of its great interest:

Again unless there shall be a least, the very smallest bodies will consist of infinite parts, inasmuch as half of a half will always have a half and nothing will set bounds to the division. Therefore between the sum of things and the least of things what difference will there be? There will be no distinction at all; for how absolutely infinite soever the whole sum is, yet the things which are smallest will equally consist of infinite parts.

The significance of the passage and the nature of the error contained in it will be clearer if we note that it is a portion of the argument by which the author seeks to establish his contention that among the parts composing an atom (which is by assumption the smallest material particle capable of existing spatially separate from all other particles) there is a least part, by which is meant a part so small that none of the parts is smaller. Paraphrased in modern terms this portion of the argument would run about as follows: 'if among the parts composing an atom and being such that no two of them have points in common save points of a common surface there be no least part, then the atom consists of an infinite number of parts; the number of atoms in the universe is infinite; these two infinite multitudes of finite portions of matter are equivalent; the sum of the elements of the latter multitude is an infinite magnitude; such, too, is the sum of the elements of the former multitude; but this sum is the atom itself; hence, unless there be a least part among the parts of an atom, an atom is an infinite magnitude and as such is no less than the sum of all matter'. The error is not due to a wrong conception of infinity, whether of multitude or of magnitude, but is obviously due solely to the tacit assumption of the false proposition that the sum of the elements of any infinite multitude of finite elements is infinite. An obvious moral is that a little knowledge of the convergence of series would greatly improve the philosophy of poets and the science of philosophers.

It is astonishing that the mentioned fallacy occurs in immediate conscious connection with a line seeming to refute it: 'the half of the half will always have a half'. What is the explanation? It is not to be found in any supposition of stupidity or of momentary nodding. It is to be found in the author's purpose and point of view. He was exclusively concerned with natural phenomena, with what he deemed to be existing entities. Regarding the series, 1/4, 1/4, 1/8, . . . , he would have said in effect:

²Munro's Lucretius, <Translation>, 4th ed., p. 83. ³Cf. Munro, pp. 39, 40, 41, or Bailey's Lucretius On the Nature of Things, pp. 76, 83, 84.

'Composed of man-made symbols like words, it is not nor ever can be endless; to speak of the sum of a nonexisting endless series is meaningless; moreover, even if we supposed the series to be endless, to be summable and to have I for its sum, this I would be neither finite nor infinite, for it would not be a magnitude, inasmuch as the summands are themselves not magnitudes but are merely empty abstract symbols; if I be said to be a magnitude, in the sense of representing a magnitude, then, if the magnitude I be composed of two equal magnitudes, 1/2 will be a magnitude in the same sense, and so on for the other symbols; if all the symbols be magnitudes in the indicated sense, the summation of the abstract series will be the summation of an endless series of magnitudes; otherwise not; and now what I have contended in my book is that, if the magnitude I be finite, not more than a relatively few of the symbols of the series can be magnitudes, and this contention, denying the infinite divisibility of finite magnitude, is based on grounds other than that advanced in the above-quoted passage from my argument'.

This is not the place to recount, much less to estimate. those 'other' grounds. It must, however, be said, in passing, that one of them is in point of kind almost perfectly indicated by the following words of Clerk

What we assert is that after we have divided a body into a certain finite number of constituent parts called molecules, then any further division of these molecules will deprive them of the properties which give rise to the phenomena observed in the substance.

The classic form of the false thesis tacitly invoked by Lucretius in the above-quoted passage to fortify his 'other' grounds for denying the infinite divisibility of a finite magnitude is exceedingly vague: all infinites are equal. It has had an age-long and world-wide vogue. Thus Kanadi, an old Hindoo author, employs the thesis to prove that, if every body be infinitely divisible, there can be "no difference of magnitude between a mustard seed and a mountain6". In this connection mathematicians, especially those who may be interested in the history of the notion of infinity, will be glad to have their attention called to a little-known letter⁶ of Newton dealing with the matter. The letter, which is addressed to Richard Bentley, is very interesting on several accounts: it points out the vagueness and the falsity of the above-mentioned thesis, which Dr. Bentley had assumed to be true; it repeatedly employs the term infinite in a sense not less vague and indeterminate; it virtually asserts that, if two infinite magnitudes be equal, the addition of any finite magnitude to either of them will destroy the equality.

In closing this note I desire to guard against the danger of leaving a false impression. The mere correctness of the Lucretian concept of infinity by no means accounts for the immense rôle of the concept in the author's work. The secret lies in the fact that the concept so powerfully stimulated the imagination of a great thinker and poet as to cause him to express and to preserve in immortal form a body of ideas which he had acquired from the then still extant works of Epicurus and which after the long lapse of centuries are found to be among the most fruitful scientific ideas of our time. C. I. KEYSER. COLUMBIA UNIVERSITY.

THREE-HUNDREDTH ANNIVERSARY OF THE PERSE SCHOOL

According to the London Morning Post, The Perse School, at Cambridge, celebrated its three-hundredth anniversary on November 15 last. The occasion was deemed important enough to call for the presence of Mr. H. A. L. Fisher, Minister of Education, who delivered an address in honor of the occasion and of Stephen Perse, founder of the School. Someone who signs himself "E. B. O." sent to the Post a very enthusiastic eulogy of the School, from which I copy a few sentences.

<The Perse School > is a laboratory, in fact, of the applied science of education—a place, moreover, where experiments set afoot by teachers of genius, mightily in love with their calling, have long since been justified by experience.

This is due to the operation of new methods and a new relationship between master and pupil which are not so easily defined, though very definitely felt, by any intelligent visitor. The mystery-a miracle to middle-aged persons brought up under the soulless old gerund-grinding routine—is best elucidated by considering the way in which Latin and Greek are taught by the Headmaster, Dr. W. H. D. Rouse, who has been the new founder of the Perse School, and has found men to co-operate in his purpose. Latin and Greek are taught as living languages; which, indeed, they are, for they were never for a moment dead except in that crypt of the dull pedantic mind. The boys learn to talk Latin and Greek at their ease, to joke and chaff in them, to think in them. Let those who have kept enough of their laborious schooling consider the following passage from a paper by Dr. Rouse in a group of essays published by experts on the new teaching.
"If they (the boys) can play like this with their

knowledge, if they can jest and pun, is Latin or Greek a dead language? One, Bird, came in with a message: at once some one cried 'Bonum omen! avis a dextra!' One talking of metre, happened to say, 'lori πούς —', and another, not letting him finish, asked 'ποῦ' στι'; I remarked of a certain vive voce summary, At once some one said, 'ohlyor Te kal βραχύ μένφίλον τε', and another, 'βραχύς γάρ και ὁ παίς'. Oragain, on Ovid, Ex Ponto i, 2, 20, the reader explained, 'Niobe saxea est facta', another added 'Sicut Lotti uxor', and a third 'Salse dictum!' Trifles, no doubt, but are they so bad? would they not add a spice to table-talk? And they are signs of a mood which I venture to think is not unimportant for education. One more I will add, to show how naturally mistakes are corrected. A boy read (Hor. iv. 14, 5), 'o qua sol habitabilis illustrat oras'; amidst general laughter some one cried, 'Non est sol habitabilis'. I said: 'Si sol habitabilis est, i tu et habita', and a boy said, 'Non in sole habitat ille sed in luna; est lunaticus'. this better than 'Parse habitabilis', or 'What does it agree with?" C. K.

Theory of Heat, p. 285.
See Daubeny's Introduction to the Atomic Theory, p. 5.

See The Works of Richard Bentley, vol. III, p. 207.

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